

# A FLORISTIC SURVEY OF FORT MATANZAS NATIONAL MONUMENT, ST. JOHNS COUNTY, FLORIDA

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## ABSTRACT

Fort Matanzas National Monument, administered by the National Park Service, U.S. Department of the Interior, comprises 127 ha (313 acres) that includes portions of two barrier islands in St. Johns County, Florida: northern Rattlesnake Island, where the historic Fort Matanzas is located, and southern Anastasia Island. A floristic survey was conducted to provide Park Service personnel with a vouchered checklist of vascular plant species, supplemented with salient information such as relative abundance, locality data, and community type. Four intensive collecting trips conducted in 2003–2004 yielded 237 species of vascular plants in 189 genera of 73 families. The four largest families are Poaceae, Asteraceae, Fabaceae, and Euphorbiaceae. A map, descriptions, and photographs of the various plant communities are also provided.

## RESUMEN

El Monumento Nacional Fuerte Matanzas, administrado por el Servicio de Parques Nacionales del Departamento del Interior, tiene una extensión de 127 ha e incluye dos islas de barrera localizadas en el condado de St. Johns, Florida: al Norte la Isla Rattlesnake donde se encuentra el Fuerte Matanzas, y al Sur la Isla Anastasia. Fue realizado un monitoreo florístico por el personal del Servicio de Parques Nacionales, utilizando una lista de especies testigo, que presenta información sobre la descripción, abundancia relativa, localidad y el tipo de comunidad florística de las especies de plantas vasculares de la zona. Se realizaron cuatro viajes de colecta intensiva entre 2003 y 2004, de los cuales se obtuvieron un total de 237 especies de plantas vasculares, pertenecientes a 189 géneros y 75 familias. Las cinco familias más representadas son Poaceae, Asteraceae, Fabaceae, Amaranthaceae y Euphorbiaceae. Se presentan mapas, descripciones y fotografías de varias de las comunidades de plantas muestreadas.

## INTRODUCTION

**Study Area**

Fort Matanzas National Monument, administered by the National Park Service (NPS; U.S. Department of the Interior), is located 14 mi (22.5 km) south of St. Augustine along State Road (S. R.) A1A in St. Johns County, Florida (Fig. 1A). The park comprises 313 acres (127 ha; Fig. 1B): the southern tip of Anastasia Island (138 acres, 56 ha) and the northern third of Rattlesnake Island (175 acres, 71 ha; NPS 2004). Both islands are separated from mainland Florida by the Matanzas River and the Intracoastal Waterway. These linear shaped barrier islands of quartz sand parallel the gently sloping Atlantic coastline and occur on underlying coquina (the Anastasia formation), a soft whitish limestone formed primarily of coarsely broken shells naturally cemented together (Waterbury 1993). The historic Fort Matanzas (discussed below), built from quarried coquina stone, is situated on northeast Rattlesnake Island overlooking the Matanzas River. A comprehensive and vouchered survey of the vascular flora had not previously been conducted for this NPS controlled land.

**Anastasia Island.**—The Anastasia Island portion of the park [1.0 mi (1.6 km) long; minimum width 0.02 mi (0.03 km), maximum width 0.4 mi (0.6 km)] consists of stabilized beach dunes rising as much as 27 ft (8.2 m) above sea level and is bisected by S. R. A1A that becomes a bridge over the southernmost tip of the island (Fig. 1B). Park property borders along A1A are 50 ft (15.2 m) from the center line of the highway on each side (east and west). The park is hemmed in by dense beachfront housing development to the north, and the Summer Haven community across the S. R. A1A bridge, to the south.

Most NPS land here is accessible to the public. Along southwest S. R. A1A are two entrance points to the Matanzas River (main visitor center and a dune boardwalk, numbered 1 and 4, respectively, in Fig. 1B), and across S. R. A1A to the east, two points of easy access to the Atlantic Ocean [beach ramp (2 in Fig. 1B) and dune boardwalk (5)]. The visitor center encompasses a parking lot/gift shop/picnic area, park headquarter offices/maintenance areas, boat dock, and a nature trail/boardwalk [through dense forest (3)]. A small parking lot for a boardwalk (4) through the dunes out to the Matanzas River is 0.35 mi (0.56 km) further south along west S. R. A1A. Directly across the highway to the east is another parking lot for the third, much longer boardwalk (5) over the fragile dune system, which terminates in an overlook of the Atlantic Ocean. Another parking area opposite the visitor center entrance (2) cuts through the dunes and allows vehicle access to the Atlantic Ocean. This popular beach even has traffic “lanes” along the shore (speed limit 10 mi/hr) policed by NPS personnel; however, only four-wheel drive vehicles are allowed along the southwest “hook” of the island bordering Matanzas Inlet where the sand is less compacted and where Least Terns nest for part of the year.

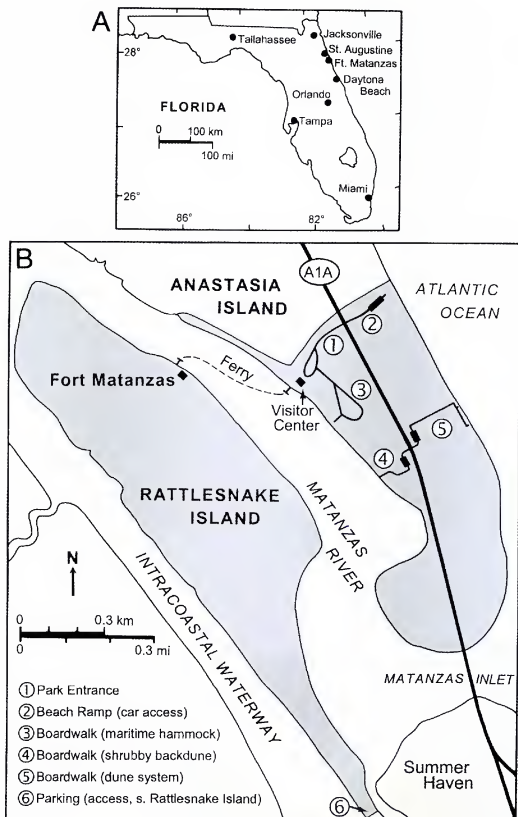


FIG. 1. Location and boundaries of Fort Matanzas National Monument. A. General location of Fort Matanzas, ca. 14 mi (22.5 km) south of St. Augustine, Florida. B. Fort Matanzas National Monument park property (shaded), comprising the northern third of Rattlesnake Island and the southern tip of Anastasia Island. Modified from NPS (2004).

**Rattlesnake Island.**—When Fort Matanzas was built in 1740, the island it occupied totaled less than two acres, and a soldier on the gun deck could look directly out over the ocean. Erosion and shifting tidal deposits have altered the inlet, and the fort is now about 0.5 mi (0.8 km) farther from the Atlantic Ocean (Fig. 2). In the early 1900's the Army Corps of Engineers dug the channel for the Intracoastal Waterway west of the fort (Fig. 1B), and the little island was joined with other islets, creating a much larger isle now called Rattlesnake Island (Chandler 2002).

The Rattlesnake Island park area [1.28 mi (2.1 km) long; minimum width 0.03 mi (0.05 km), maximum width 0.31 mi (0.50 km)] is bordered to the south by exclusive waterfront homes. The northern and southern ends of the park have been created mainly by dredged spoil from the Intracoastal Waterway, and tidal creeks and a labyrinth of mosquito control ditches fragment the low-lying central portion (Fig. 3). Most of the island is less than 5 ft (1.5 m) above sea level, although the central fill area at the northern end rises to ca. 17 ft (5.2 m).

The majority of NPS land on Rattlesnake Island is closed to the public. Fort Matanzas on the northeast coast is accessible for brief (ca. 45 min.) guided tours via a forty-two passenger boat that crosses the river eight times daily from the visitor center on Anastasia island. Annually, over 50,000 tourists visit the fort (NPS 2004). A parking area at the southeastern park border (6 in Fig. 1B) allows access for fishing, although we noted very little activity along the jetties, especially in comparison to the popular southwestern beaches of Anastasia island along the river and inlet.

### **Brief History of Fort Matanzas National Monument**

Spanish colonial history in Florida (mid-sixteenth to early nineteenth centuries) involved crucial events around the Matanzas Inlet (Manucy 1943; Schesventer et al. 1980; Chandler 2002). The name Matanzas, the Spanish word for slaughters, reflects the violent history of the area – specifically, the massacre of 245 French soldiers in 1565 under the orders of Pedro Menéndez de Avilés. On two occasions, soldiers trying to reach Fort Caroline (near present-day Jacksonville) had shipwrecked in the inlet and surrendered to the Spanish. As “heretics” (Huguenots or Protestants) and a threat to Catholic Spanish colonization in Florida, they were subsequently executed behind the dunes on Anastasia Island.

A sentry post at Matanzas with no armament was erected by 1569 as part of a series of lookouts along the uninhabited Matanzas Inlet. The wooden watchtower was not optimal for weathering the warm temperatures and high humidity. The well preserved stone-masonry fort standing on present-day Rattlesnake Island (see photograph in lower right of Fig. 3) was constructed in 1740–1742. Fort Matanzas, designed by engineer Pedro Ruiz de Olano, is a simple, two-story, square structure: 49.5 ft (15.0 m) on each side with a 12 ft (3.7 m) gundeck with two 4 ft (1.2 m) tall parapets (east and west sides) and 30 ft (9.1



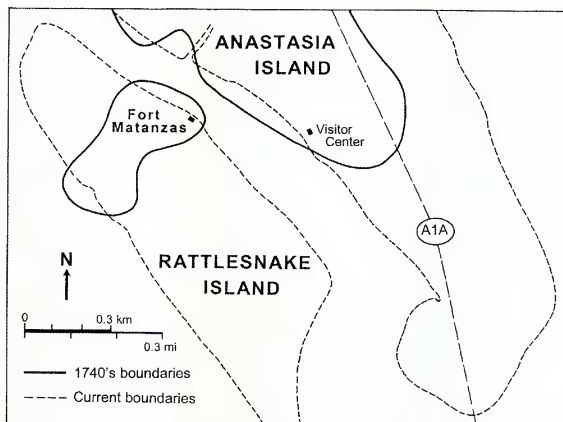


FIG. 2. Perimeter changes of Rattlesnake and Anastasia Islands over 250 years. Island boundaries in the 1740's (when Fort Matanzas was built) modified from Schesventer et al. (1980); present-day boundaries based on St. Johns County GIS Division (2002; also see Fig. 3).

m) tower (north side; Schesventer et al. 1980). The foundation originally comprised a system of closely-set pine pilings, driven deeply into the marshy substrate. The walls are coquina blocks comprising native shellstone (mainly *Donax variabilis*) probably quarried from El Peñón (within present-day Summer Haven) and originally were covered with mortar made of lime from burnt oyster shells, mixed with sand and water.

Fort Matanzas was armed with five cast iron cannon and usually manned by seven to 10 soldiers but could accommodate a planned maximum of 50 soldiers. The men were assigned to the fort for one-month duty tours as part of their regular rotation among the outposts and missions near St. Augustine. They had to bring supplies to last the whole month on small boats from St. Augustine; drinking water was either transported by boat or collected into a cistern as rainwater fell on the observation deck of the fort.

The strategic location of Fort Matanzas at the mouth of Matanzas Inlet helped maintain Spanish control of the waterway and served as a sentry to warn garrisons at St. Augustine about potential enemies approaching from the south

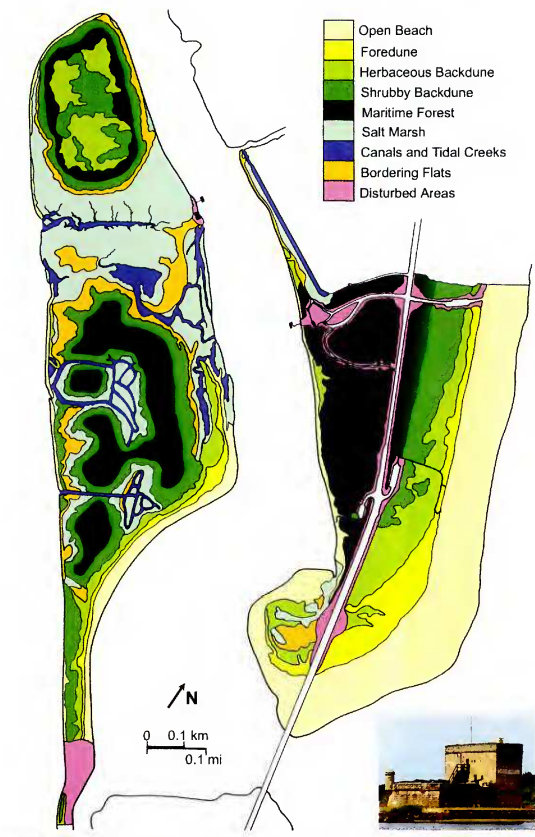


FIG. 3. General vegetation map of Fort Matanzas National Monument based on satellite imagery (St. Johns County GIS Division 2002) and field observations. Lower right: photograph of east face of Fort Matanzas. Photo credit: Wendy B. Zomlefer.

via the Matanzas River. The fort also functioned as a rest stop, coast guard station, and a place where Spanish vessels headed to St. Augustine could be advised on navigating the river. The inlet was close enough to Fort Matanzas that ships trying to enter the inlet came within range of the fort's guns. However, soldiers fired the fort cannons in battle only once, in 1742, thwarting two British vessels attempting to gain the inlet.

Over the next hundred years, Florida became a diplomatic pawn (Gold 1969). Fort Matanzas suffered periods of neglect during subsequent British (1763–1784) and second Spanish (1784–1821) occupations. The aging fort posed serious maintenance problems (Krakow 1986). By the late 1700's, the east foundation, facing the Matanzas River, was eroding. By the time Spain deeded Florida to the United States in 1819, the fort was so badly deteriorated that soldiers could no longer live inside.

The United States formally took possession in 1821 but never occupied the fort. At this time Fort Matanzas became the administrative property of the War Department as a national military park. By the turn of the twentieth century, the fort was overgrown with vegetation, including mature shrubs and trees, such as *Juniperus virginiana*, *Myrica cerifera*, and *Quercus virginiana* growing from the gundeck (Bryant 1872; Schesventer et al. 1980). The walls were cracked, and the south side leaned precariously on a weakened foundation undermined by the tides. In 1916, funds were granted by Congress for management and stabilization of the structure under a contract between the War Department and the St. Augustine Historical Society and Institute of Science (Krakow 1986). In 1924 President Calvin Coolidge proclaimed Fort Matanzas a national monument (Executive Proclamation No. 1713), and three years later the land around the fort was assigned to the Department of Agriculture as a bird refuge (Executive Order No. 4704).

President Franklin D. Roosevelt issued Executive Order No. 6166 in 1933, transferring Fort Matanzas (and other military parks and cemeteries) to the National Park Service, Department of the Interior. Over the past seventy years, the NPS has overseen extensive restoration, including installation of stainless steel rods that hold the upper portion of the fort together (Schesventer et al. 1980; Chandler 2002). As a result of these preservation efforts, Fort Matanzas, a unique relic of military architecture in the United States, retains its basic historic structure. Shoreline stabilization also requires constant vigilance. The original national monument site consisted of only the fort on Rattlesnake Island, but through the years, NPS has acquired additional land on both Rattlesnake and Anastasia Islands (see Krakow 1986), thereby preserving an intact (and imperiled) barrier island ecosystem.

#### MATERIALS AND METHODS

The first authors, PI Giannasi and coPI Zomlefer, lead four intensive field trips in 2003 (28–30 May, 29–31 July, 26–27 September) and 2004 (12–13 April) to

collect vascular plant specimen vouchers in triplicate using standard field and herbarium techniques (under NPS collecting permit #FOMA-2003-SCI-0005) with assistance of the coauthors and other personnel listed in the acknowledgments. Plant associations were also assessed. A complete set of vouchers is deposited at GA, and one duplicate set at FLAS. The second duplicate set has not yet been distributed pending resolution of issues concerning NPS ownership of voucher specimens. The floras of Wunderlin & Hansen (2000, 2003) were primary sources for plant identification, supplemented by Godfrey & Wooten (1979, 1981). The majority of plants were identified by WBZ and DEG; coauthor LMK identified most ferns, grasses, and sedges; and coauthor WSJ confirmed other problematic determinations.

## RESULTS AND DISCUSSION

### Floristics

The 485 numbered collections (194 from Rattlesnake Island, 291 from Anastasia Island) comprise 237 species (plus two varieties): 125 species from Rattlesnake Island and 197 from Anastasia Island (see ANNOTATED CHECKLIST OF SPECIES below). Included in the list are 14 species planted around park headquarter buildings on Anastasia Island (indicated as "CULT"); *Zamia pumila*, a native species, occurs naturally in the park and is also cultivated there, and *Severinia buxifolia* is cultivated and has also escaped to the nearby hammock. The largest families are Poaceae (32 spp.), Asteraceae (28 spp.), Fabaceae (14 spp.), Amaranthaceae s.l. (9 spp.), Euphorbiaceae (9 spp.), and Rubiaceae (8 spp.). With completion of this survey, we have vouchered 57 new county records (53 species and four varieties) for St. Johns County, Florida, according to Wunderlin and Hansen (2004). No Florida endemics (Wunderlin & Hansen 2003) nor any state/federally listed endangered/threatened plants (Coile & Garland 2003; U.S. Fish and Wildlife Service 2004) were found. However, *Zamia pumila* (Florida arrowroot, coontie), which occurs naturally in the backdune/maritime hammock habitats (also planted around park headquarters), is a state listed "commercially exploited plant" (Coile & Garland 2003). In addition, harvesting *Uniola paniculata* (seaoats) is prohibited by Florida Statute 370.041 (State of Florida 2004) because of this species' crucial role as a dune builder and stabilizer.

Excluding the 12 cultivated exotics, the remaining 46 introduced species represent 20.4% of the total and include five listed as invasive exotics (FLEPPC 2004). Four (*Asparagus aethiopicus*, *Cinnamomum camphora*, *Nephrolepis cordifolia*, *Lantana camara*) are ranked as Category I (invasive exotics altering native plant communities by displacing native species, changing community structures/ecological functions, or hybridizing with natives), and one, *Pteris vittata*, as Category II (invasive exotics increasing in abundance/frequency but not yet altered Florida plant communities to the extent shown by Category I

plants). In addition, *Schinus terebinthifolius* (Brazilian pepper), another Category I plant, had recently been extirpated by NPS personnel from the southern portion of Rattlesnake Island; reinvasion is possible, however, from fruiting plants observed by the authors near some homes adjacent to the park boundary. The one colony of *Nephrolepis cordifolia* (tuberous sword fern) growing on the edge of the forest near park headquarters (Anastasia Island) was sprayed by park personnel with herbicide the day after we collected vouchers; aggressive efforts to eradicate *Asparagus aethiopicus* (Sprenger's asparagus-fern) from the boat dock area were also underway. The relatively few plants of *Lantana camara* (lantana) occur sporadically in disturbed areas and occasionally in the backdune community. The one cultivated tree of *Cinnamomum camphora* (camphortree) is near maintenance buildings adjacent to the hammock. The cliff fern *Pteris vittata* (Chinese ladder brake), a significant arsenic hyperaccumulator (Ma et al. 2001), grows on the outer walls of Fort Matanzas and would require careful, probably mechanical, removal since the rhizomes deeply penetrate the precious coquina.

### Plant Communities

The six major community types of the study area (open beach, foredune, backdune, maritime forest, salt marsh, and disturbed areas), discussed below and depicted in Figs. 3 to 5, are based upon satellite imagery (St. Johns County GIS Division 2002), our field observations, and classifications of similar areas by FNAI (1990), Johnson and Barbour (1990), Montague and Wiegert (1990), and Easley and Judd (1993). Barrier islands are dynamic habitats: zonation of species from the coast inland is controlled by the tolerance of plant growth habits to salt spray and sand burial, as well as wave-driven erosion and overwash (Leatherman 1988; Johnson & Barbour 1990). Overall species diversity is low, and several species may occur in more than one community. These maritime habitats are fairly uniform but may intergrade in the study area. We, therefore, have also designated several habitat subcategories to accommodate certain ecotones (Fig. 3): herbaceous backdune, shrubby backdune/maritime forest, and bordering flats (of the salt marsh).

**Open Beach.**—This area, also referred to as upper beach (e.g., Johnson & Barbour 1990), comprises exposed sandy beach up to the high tide line. High energy waves pound the shoreline and deposit sand grains, forming the beach. Anastasia Island has a well-developed open beach along the Atlantic Ocean, Matanzas Inlet, and the southwestern tip bordering Matanzas River (Figs. 3, 4A). The open beach along Rattlesnake Island, however, is more limited and is best developed along the southeastern shore along the river. Coastal perimeter and sandbar development varies with the tides and sand deposition, especially along the southern hook of Anastasia Island (Fig. 3). This habitat is generally



FIG. 4. Plant communities of Fort Matanzas National Monument Park. **A.** Open beach (eastern Anastasia Island): ramets of *Ipomoea pes-caprae* and *I. imperati* growing perpendicular to the ocean shore. **B.** Foredune (eastern Anastasia Island): *Ipomoea pes-caprae* and *Chamaecrista fasciculata* (below); *Croton punctatus*, *Heterotheca subaxillaris*, and *Uniola paniculata* (above). **C.** Herbaceous backdune (western Anastasia Island) at boardwalk entrance, west S. R. A1A: *Gaillardia pulchella*, *Helianthus debilis*, *Muhlenbergia capillaris*, and *Polypremum procumbens* (foreground); shrubby backdune vegetation (background). **D.** Shrubby backdune (eastern Rattlesnake Island): *Iva frutescens* and *Serenoa repens* (foreground); *Juniperus virginiana* and *Ilex vomitoria* (background). Photo credits: **A**, David E. Giannasi; **B–D**, Wendy B. Zomlefer.

unvegetated with the exception of ramets of *Ipomoea imperati* and *I. pes-caprae* that may trail over the high tide line on Anastasia Island (Fig. 4A) where vehicles are allowed on the beachfront but not near inland dune vegetation.

**Foredune.**—This plant community, also called beach dune (FNAI 1990) or ocean beach (Easley & Judd 1993), includes terraces, overwash, and blowout sites adjacent to the beach itself (Johnson & Barbour 1990) and is a mobile and harsh environment sparsely to densely vegetated with pioneer species, especially seaots ("seaots zone," *Uniola paniculata*). The foredune forms as sand accumulates around plants. These sand particles, compared to those of the adjacent open beach, are smaller due to selective uplifting by wind. The vegetation must, therefore, tolerate burial by sand, as well as exposure to wind, salt spray, intense sunlight, and storms. Dune height is determined by wind strength and growth habits of certain dune-forming plants. Plants continuously recolonize the habitat due to periodic disturbance by waves from storms and high tides (Oertel & Larsen 1976). This community is particularly vulnerable to human impact: large gaps or blowouts in the foredune from footpaths or off-road vehicle trails destabilize the substrate, thereby providing opportunities for erosion by wind and water.

The foredune community is best developed as a distinct border between the open beach and much higher backdune (described below) along the Atlantic coast and southern hook of Anastasia Island (Figs. 3, 4B). The fragile system on Anastasia Island is protected from trampling by two boardwalks over the dunes (Fig. 1B); direct public access by foot or vehicle is forbidden. On Rattlesnake Island, this vegetation often intergrades with backdune and occurs mainly along the river beach (Fig. 3).

Foredune habitats in the study area have been usually built by *Uniola paniculata*, as well as two other dune grasses, *Panicum amarum* and *Spartina patens*. The growth of these species is stimulated by sand burial, with vertical growth keeping pace with burial, and lateral growth via runners forming a continuous dune ridge (Wagner 1964). The colonial and succulent morning-glories, *Ipomoea imperati* and *I. pes-caprae*, are usually the first invaders of foredune and beach after storm erosion. The plants produce long stolons that creep across the barren sands at right angles to the coast (Fig. 4A), ensuring ramets both on the old and newest foredunes (Johnson & Barbour 1990). Other pioneer species (often succulent), consistently found seaward of the foredune, include: *Atriplex cristata*, *Cakile edulenta*, *Cakile lanceolata*, *Cenchrus tribuloides*, *Chamaesyce bombensis*, *Gaillardia pulchella*, *Helianthus debilis*, *Iva imbricata*, *Salsola kali*, *Sesuvium portulacastrum*, and *Sporobolus virginicus*. *Croton punctatus*, *Hydrocotyle bonariensis*, *Oenothera humifusa*, *Phyllanthus abnormis*, and *Physalis walteri* are examples of wider-ranging species also characteristic of this zone. Several common weedy species, such as *Chenopodium ambrosioides*,

*Chamaesyce maculata*, and *Heterotheca subaxillaris* also thrive on the foredunes; dense patches of *Distichlis spicata* occur in several wetter areas. Shrubby plants with lower salt tolerance, such as *Ilex vomitoria* and *Screnoa repens*, typically grow on the lee side of the foredunes where they are somewhat protected from sand burial and salt spray.

**Backdune.**—The backdune, also called the transitional zone (Johnson & Barbour 1990), coastal strand (FNAI 1990), open shrubby interior, maritime thicket, and coastal scrub (FNAI 1990; Easley & Judd 1993), is an ecotonal community generally occurring between foredune and maritime hammock and shares many species of both. These deep, stabilized, wind-deposited coastal dunes are covered with variable, often patchy, vegetation. Backdune communities are generally stable, and as prime beachfront real estate property, comprise one of the most rapidly disappearing community types in Florida (FNAI 1990). Originally a nearly continuous band along the Atlantic coast, backdune now occurs in isolated short stretches.

Along eastern Anastasia and Rattlesnake Islands, backdune comprises herbs to low shrubs (Fig. 4C, D) plus adjacent regions covered with low, dense, often impenetrable woody vegetation intergrading with maritime hammock community to the west (Fig. 5A). Therefore, the backdune habitat of the study area is here divided into two, more or less, well-demarcated subzones (discussed below), herbaceous backdune and shrubby backdune.

**Herbaceous backdune zone.**—This backdune zone, immediately bordering the foredune (Fig. 4C), is characteristically a broad flat area occupied by a mixture of herbs, often low-growing, including *Chamaecrista fasciculata*, *Gaillardia pulchella*, *Helianthus debilis*, *Heterotheca subaxillaris*, *Hydrocotyle bonariensis*, *Ipomopsis rubra*, *Iresine rhizomatosa*, *Opuntia pusilla*, *Opuntia stricta*, *Solanum chenopodioides*, and *Strophostyles helvola*, as well as several predominant grasses: *Andropogon glomeratus*, *Muhlenbergia capillaris*, *Spartina patens*, and *Uniola paniculata*. Some low shrubby plants, such as *Borrichia frutescens* and *Iva imbricata* may also occur. As in the foredune, many backdune species are succulent, have thickened cuticles, root readily from fragments, produce floating seeds, and/or spread by runners.

**Shrubby backdune zone/maritime hammock.**—Further inland, the backdune community commonly comprises a low, dense, often impenetrable thicket of salt-tolerant shrubs and small trees. The characteristic pruned and dwarfed form of these woody plants (see *Juniperus* in Fig. 4D) results from salt-spray laden winds that kill terminal buds on twigs facing the sea (Johnson & Barbour 1990). In the study area, this shrubby backdune zone (Figs. 3, 4D) gradually intergrades with maritime hammock, especially on the northwestern Anastasia Island portion of the park. Characteristic shrubby species (also often in forest understory) include: *Baccharis halimifolia*, *Ilex vomitoria*, *Iva frutescens*, *Myrica cerifera*, and *Sideroxylon tenax*; *Screnoa repens* commonly favors the



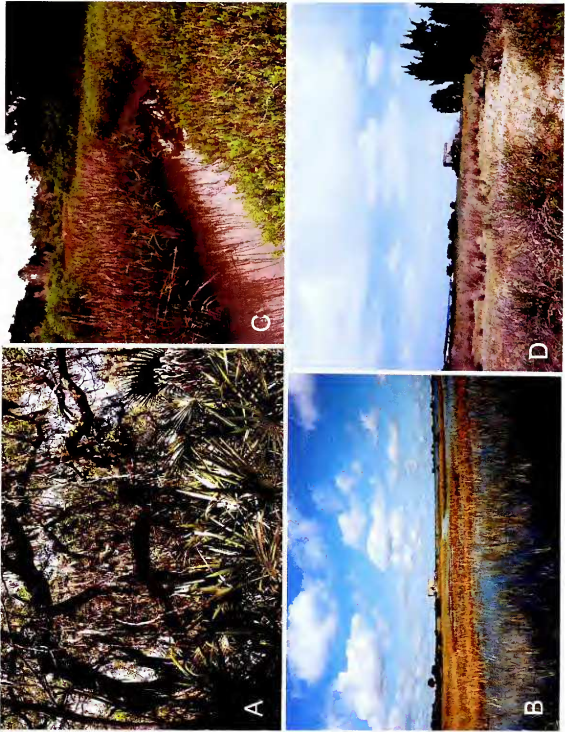


FIG. 5. Plant communities of Fort Matanzas National Monument Park, continued. **A.** Maritime forest (western Anastasia Island): *Serenoa repens* (understory); *Quercus virginiana* branches covered with *Tillandsia usneoides* and *Vitis* spp. vines (overstory). **B.** Salt marsh at high tide (central Rattlesnake Island): pure stand of *Spartina alterniflora*; Fort Matanzas (distant background). **C.** Tidal creek (central Rattlesnake Island) bordered by *Spartina alterniflora* (left) and *Botis maritima* (right). **D.** Bordering flats along salt marsh (east-central Rattlesnake Island): *Muhlenbergia capillaris* and *Eragrostis elliottii* (foreground); *Juniperus virginiana* (right background); Fort Matanzas (central background); *Avicennia germinans* in saltmarsh (small "shrubs," center and far left, distant background). Photo credits: **A**, Alexander Reynolds; **B–D**, Wendy B. Zomlefer.

protected lee slopes and flats behind steeply eroded dunes. *Juniperus virginiana*, *Persea borbonia*, *Prunus serotina*, *Sabal palmetto*, and *Zanthoxylum clavaherculis* are common tree associates. On the northwestern side of the Anastasia Island park area, portions of shorter shrubby backdune are almost completely covered by dense mats of tangled woody vines of *Ampelopsis arborea*, *Cissus trifoliata*, *Parthenocissus quinquefolia*, *Smilax auriculata*, *Vitis aestivalis*, and *Vitis rotundifolia*, as well as the herbaceous vine, *Mikania cordifolia*. Along the west border of the disturbed area comprising south Rattlesnake Island (see Fig. 3), a narrow strip of shrubby backdune vegetation includes species such as *Chiococca alba*, *Teucrium canadense*, *Vigna luteola*, and *Zamia pumila*.

**Maritime Hammock.**—This vegetation type, the terminal succession stage in these coastal areas, is defined as the impenetrable band of “hardwood” forest just inland of the dune community (Laessle & Monk 1961; Stalter & Dial 1984; FNAI 1990). The habitat is also referred to as coastal hammock (Easley & Judd 1993), stable dune zone, and maritime forest (Johnson & Barbour 1990). The dense wind-pruned canopy over the old, stabilized, white sand-dunes combined with humus buildup contributes to some moisture retention, but soils generally remain well-drained because of underlying deep sand. Many species overlap with those characteristic of the shrubby backdune. As with backdune, maritime hammock is prime resort and residential property and originally was an almost continuous band (with the dune system) along the coast of Florida but is now fragmented by development into short segments (FNAI 1990).

Typical mature maritime forest, best developed along the western coast of Anastasia Island (Figs. 3, 5A), forms a continuum with the shrubby backdune zone to the east (described above). The forest often covers relatively steep terrain, and sometimes the tops of large trees are near eye-level as one stands on the peak of an old dune. The dominant species are *Quercus virginiana* and *Q. geminata*, whose branches are characteristically covered with epiphytes *Pleopeltis polypodioides*, *Tillandsia recurvata*, and *Tillandsia usneoides*. *Persea borbonia* is a principal understory tree, along with *Asimina parviflora*, *Juniperus virginiana*, *Quercus myrtifolia*, *Prunus serotina*, and *Sabal palmetto*. *Callicarpa americana*, *Ilex vomitoria*, *Myrica cerifera*, *Sideroxylon tenax*, *Serenoa repens*, *Rhus copallinum*, and *Zamia pumila* are common understory shrubs (or shrubby trees). As in the backdune, woody vines are prevalent (i.e., *Parthenocissus quinquefolia*, *Smilax auriculata*, *Smilax bona-nox*, *Vitis aestivalis*, *Vitis rotundifolia*); herbaceous understory plants include *Galium hispidulum*, *Oplismenus hirtellus*, *Rivina humilis*, *Ruellia caroliniensis*, and *Teucrium canadense*.

The northern tip and western coastline of Rattlesnake Island, along the Intracoastal Waterway, support a much different maritime forest vegetation lacking oaks and dominated by *Celtis laevigata*, *Juniperus virginiana*, *Persea*

*borbonia*, *Pinus elliottii*, and *Sabal palmetto*. *Pinus elliottii* (10–12 m tall) is more common on the northern portion of the island. Numerous snags of slash pine along the western coast indicate that this once dominant species has been declining and has been replaced by the more common juniper, cabbage palm, and large trees of *Celtis laevigata* that reach heights of over 12 m (0.5–1.0 m dbh). Common understory shrubs (to small trees) include *Ilex vomitoria* (4–5 m tall), *Myrica cerifera*, *Serenoa repens*, *Sideroxylon tenax*, *Zamia pumila*, and *Zanthoxylum clava-herculis*. *Smilax auriculata* is also common throughout the hammock. The dark forest floor supports little herbaceous understory except for occasional plants of species such as *Bacopa monnieri*, *Galium hispidulum*, and *Pilea microphylla* in exposed damp areas.

**Salt Marsh.**—The salt marsh system includes tidal marsh (FNAI 1990), tidal creeks, and bordering flats (Easley & Judd 1993) – distinguished as separate habitat subtypes in Fig. 3 for the study area. Salt marshes in Florida, most abundant north of the normal freeze line, are coastal communities of nonwoody salt-tolerant plants occupying intertidal zones at least occasionally inundated with salt water (Montague & Wiegert 1990). These plants must tolerate poorly aerated saline substrate, frequent submersion, and intense sunlight. Salt marshes develop at the land-marine water interface, especially in regions with low relief, high tidal range, and low wave energy. Therefore, the elevation varies from slightly below to slightly above sea level, with vegetation growing in intertidal and supertidal zones. Salt marsh ecotone functions in sediment stabilization and coastline storm protection. Dense stems and roots of colonizing plants trap sediments from upland runoff, and decaying marsh plant detritus accumulates to form anaerobic layered soils.

Within the park, the salt marsh system is best developed in the north-central portion of Rattlesnake Island, as well as some smaller areas along the east-central and south-central coastlines (Figs. 3, 5B). The salt marsh system here also includes a distinct network of drainage gullies, tidal creeks, and pools (Fig. 5C). Smaller salt marshes also occur within the southwestern tip of Anastasia Island (Fig. 3), as well as the north western most strip of the park property along the Matanzas River.

**Salt marsh proper (tidal marsh).**—Although salt marsh vegetation is often distinctively zoned in other locations (each zone dominated by a different species), large expanses of dense monotypic stands of *Spartina alterniflora* characterize the study area (Fig. 5B). *Juncus roemerianus*, another important indicator species in salt marshes elsewhere in Florida (Montague & Wiegert 1990), only occurs occasionally in a few small patches. *Spartina alterniflora* tends to grow along the deepest portions, grading subtly to other salt-tolerant plants, such as *Batis maritima* (Fig. 5C), *Distichlis spicata*, *Limonium carolinianum*, *Sarcocornia perennis* (*Salicornia perennis*), *Sesuvium portulacastrum*, and

*Suaeda linearis* along the edges. Small shrubby trees of *Avicennia germinans* (black mangrove) to 3 m tall (see background in Fig. 5D) also are well established within *Spartina* stands on both Rattlesnake and Anastasia Island. We observed little flowering and fruit set, however: our collections represent the northernmost limit of this tropical species along the east coast of Florida (Wunderlin & Hansen 2004).

**Bordering flats.**—A distinct flora also characterizes the slightly elevated ridges bordering the salt marsh proper and associated tidal waterways in the study area (Fig. 3; Easley & Judd 1993). These flat sandy meadows (Fig. 5D) are vegetated with scattered herbs (mainly grasses and sedges), including: *Chamaecrista fasciculata*, *Cynanchum angustifolium*, *Cyperus esculentus*, *Cyperus polystachyos*, *Cyperus retrorsus*, *Distichlis spicata*, *Eragrostis elliottii*, *Fimbristylis spadicea*, *Juncus dichotomus*, *Limonium carolinianum*, *Muhlenbergia capillaris*, *Opuntia pusilla*, *Paronychia herniarioides*, *Pluchea odorata*, *Portulacca pilosa*, *Scleria triglomerata*, *Setaria parviflora*, *Solidago stricta*, *Sporobolus virginicus*, and *Triplasis purpurea*, as well as occasional woody species, such as *Borrichia frutescens*, *Iva frutescens*, *Juniperus virginiana*, *Pinus palustris*, *Prunus serotina*, and *Zanthoxylum clava-herculis*.

**Disturbed areas (ruderal community).**—On Anastasia Island, disturbed habitats have developed around public-access areas, and on Rattlesnake Island, consist of large Intracoastal Waterway dredge fill areas, land within the network of mosquito control ditches, and Fort Matanzas itself (see Fig. 3). Disturbed areas associated with construction and heavy human use on Anastasia Island (i.e., land bordering S. R. A1A, visitor center/picnic tables, parking lots, park headquarters/roads) have few species in common with the habitats discussed in the preceding sections. Common weedy plants occurring primarily in these disturbed areas include: *Acalypha graciliens*, *Andropogon glomeratus*, *Cenchrus spinifex*, *Chamaesyce hirta*, *Chamaesyce hyssopifolia*, *Conyza canadensis*, *Croton glandulosus*, *Cynodon dactylon*, *Dactyloctenium aegyptium*, *Indigofera spicata*, *Lepidium virginicum*, *Malvastrum corchorifolium*, *Paspalum setaceum*, *Phyla nodiflora*, *Pteridium aquilinum*, *Salvia lyrata*, *Sida rhombifolia*, *Sonchus asper*, *Spermacoce assurgens*, *Triodanis perfoliata*, *Verbena bonariensis*, and *Verbena officinalis*.

The sandy dune-like fill area comprising the northern tip of Rattlesnake island (Fig. 3) has a distinct ring of shrubby backdune/maritime hammock vegetation (e.g., *Celtis laevigata*, *Iva frutescens*, *Juniperus virginiana*, *Pinus elliottii*, *Sabal palmetto*; discussed above under maritime hammock) enclosing an open center of patchy, herbaceous to shrubby, backdune plants, including *Myrica cerifera*, *Baccharis halimifolia*, *Opuntia pusilla*, *Phyllanthus abnormis*, *Prunus serotina*, *Sideroxylon tenax*, *Uiola paniculata*, and *Zanthoxylum clava-herculis*. Small specimens of *Oxalis corniculata* and *Pteris vittata* were the only plants

growing on the coquina walls of Fort Matanzas (northeastern coast) – a stark comparison to the varied and lush flora of 56 species we found covering the walls of Castillo de San Marcos in St. Augustine during the same study period (Zomlefer & Giannasi 2005). The small mowed lawn surrounding the fort comprises *Cynodon dactylon*, *Hydrocotyle bonariensis*, and *Stenotaphrum secundatum*.

The labyrinth of mosquito control ditches in the central southwest portion of the Rattlesnake Island park area (Fig. 3), excavated circa 1950–1960's (D. Parker, pers. comm.), drained large expanses of salt marsh, allowing growth of shrubby backdune and maritime forest (discussed above). The narrow fill area [ca 0.13 mi (0.21 km) long, 0.06 mi (0.10 km) wide, tapering to 0.03 mi (0.05 km); see Fig. 3] forming the southernmost portion Rattlesnake Island park property is an exposed flat ridge of very compact sand bordered by the Matanzas Inlet to the east and the Intracoastal Waterway to the west. This harsh, severely wind-blown habitat supports an odd flora of stunted plants (e.g., *Opuntia pusilla*, *O. stricta*) and compressed forms of normally upright plants (*Cnidioscolus stimulosus*, *Gaillardia pulchella*, *Oenothera humifusa*, *Phyllanthus abnormis*), as well as sand-hugging rosettes of *Chamaesyce bombensis* and *C. maculata*, large cushions of *Stenaria nigricans*, depauperate strings of *Galactia volubilis*, and hardy scattered tufts of grasses, such as *Cenchrus echinatus* and *Eragrostis secundifolia*.

#### ANNOTATED CHECKLIST OF VASCULAR PLANT TAXA

A list of 237 vascular plant species representing 189 genera in 73 families is here compiled from Giannasi & Zomlefer specimens (collection numbers in *italic*) in alphabetical order by family within three major groups (ferns, gymnosperms, and angiosperms). Genera, species, and infraspecific taxa are alphabetical within each family. Scientific nomenclature and common names follow Wunderlin & Hansen (2003); exceptions are vernacular names of a few horticultural plants (not included in their flora) that conform to Huxley (1992). Family circumscriptions for ferns and gymnosperms follow FNA (1993), and for the angiosperms, APG (2003).

*Non-boldface collection number* = collection from Anastasia Island; **bold-face collection number** = collection from Rattlesnake Island; underlined taxa = new voucher St. Johns County records according to on-line species list by Wunderlin & Hansen (2004); \* = exotic (Wunderlin & Hansen 2003); invasive exotics (FLEPPC 2004): [CAT I] = Category I; [CAT II] = Category II; CULT = cultivated, i.e., planted on park grounds. Habitat data: DA = disturbed areas; FD = foredune; HB = herbaceous backdune; MH = maritime hammock; OB = open beach; SB = shrubby backdune; SB/MH = shrubby backdune/maritime hammock ecotone; SM = salt marsh; SM/BF = salt marsh/bordering flats. Relative abundance: c = common (generally abundant throughout a particular habitat; species easily found); o = occasional (locally common and/or several individuals distributed within a habi-

tat; species not too difficult to locate); i = infrequent (sporadic occurrence of a small number of individuals; species relatively scarce and not easily found); r = rare (very few individuals encountered).

## FERNS

### DENNSTAEDTIACEAE

*Pteridium aquilinum* (L.) Kuhn var. *pseudocaudatum* (Clute) ex A. Heller, Bracken fern, DA; o; 127

### NEPHROLEPIDACEAE

\**Nephrolepis cordifolia* (L.) C. Presl, Tuberous sword fern, [CAT I], DA; o; 92

### POLYPODIACEAE

*Phlebodium aureum* (L.) J.Sm., Golden polypody, FD; r; 547

*Pleopeltis polypodioides* (L.) E. G. Andrews & Windham var. *michauxiana* (Weath.) E. G. Andrews & Windham, Resurrection fern, MH; c; 281

### PTERIDACEAE

\**Pteris vittata* L., Chinese ladder brake, [CAT II], DA; c; 55

## GYMNOSPERMS

### CUPRESSACEAE

*Juniper virginiana* L., Red cedar, MH, SB/MH; c; 11, 46

### PINACEAE

*Pinus elliotii* Engelm., Slash pine, MH, SB/MH; c; 427, 544, 670

### ZAMIACEAE

*Zamia pumila* L., Florida arrowroot, MH, SB/MH; o; 284 [CULT], 391, 647

## ANGIOSPERMS

### ACANTHACEAE

*Avicennia germinans* (L.) L., Black mangrove, SM; o; 51, 247, 392, 477

\**Justicia brandegeana* Wassh. & L. B. Sm., Shrimpplant, CULT; 529

*Ruellia caroliniensis* (J. F. Gmel.) Steud., Carolina wild petunia, MH; i; 276

### ADOXACEAE

*Sambucus nigra* L. subsp. *canadensis* (L.) R. Bolli,

American elder, DA; o; 130

\**Viburnum odoratissimum* Ker Gawl., Sweet viburnum, CULT; 593

### AGAVACEAE

\**Yucca aloifolia* L., Spanish bayonet, HB, MH, SM/BF; r; 268, 516, 645

### AIZOACEAE

*Sesuvium portulacastrum* (L.) L., Shoreline seapurslane, FD, SM/BF; o; 16, 409, 439

### AMARANTHACEAE

*Atriplex cristata* Humb. & Bonpl. ex Willd., Crested saltbush, FD, SM/BF; o; 244, 402, 413, 440

*Blutaparon vermiculare* (L.) Mears, Samphire, FD; i; 659

\**Chenopodium album* L., Lamb'squarters, DA; i; 602

\**Chenopodium ambrosioides* L., Mexican tea, DA; o; 128

\**Gomphrena serrata* L., Globe amaranth, DA; i; 603  
*Iresine rhizomatosa* Standl., Rootstock bloodleaf, FD, HB; o; 431, 468

\**Salsola kali* L. subsp. *pontica* (Pall.) Mosyakin, Prickly Russian thistle, FD; o; 64, 72, 115, 452, 543

*Sarcocornia perennis* (Mill.) A. J. Scott, Perennial glasswort, SM, SM/BF; c; 21, 480, 545 [= *Salicornia perennis* Mill.: The segregation of the perennial from the annual species of *Salicornia* may render *Sarcocornia* paraphyletic, and *Salicornia* s.l. (including both perennial and annual species) is likely monophyletic on the basis of the truncate perianth apices, pubescent nonperispermous seeds, and membranous testa (Judd & Ferguson 1999).]

*Suaeda linearis* (Elliott) Moq., Sea blite, SM, SM/BF; o; 475, 476

### AMARYLLIDACEAE

\**Crinum asiaticum* L., Poisonbulb, CULT; 280

### ANACARDIACEAE

*Rhus copallinum* L., Winged sumac, MH; o; 321, 519

### ANNONACEAE

*Asimina parviflora* (Michx.) Dunal, Smallflower pawpaw, MH; o; 3, 319, 518

**APIACEAE**

*Ptilimnium capillaceum* (Michx.) Raf., Mock  
bishopsweed, DA; i; 600

**APOCYNACEAE**

*Cynanchum angustifolium* Pers., Gulf coast  
swallowwort, SM, SM/BF; i; **26, 70, 404**

\**Nerium oleander* L., Oleander, CULT; 410

**AQUIFOLIACEAE**

*Ilex vomitoria* Aiton, Yaupon, MH, SB, SB/MH; C; **13, 59,**  
**110, 323, 621, 624, 648**

**ARALIACEAE**

*Hydrocotyle bonariensis* Comm. ex Lam.,  
Largeleaf marshpennywort, DA, FD; C; **52, 90,**  
**113, 122**

**ARECACEAE**

*Sabal palmetto* (Walter) Lodd. ex Schult. & Schult.  
f., Cabbage palm, MH, SB/MH; C; **49**

*Serenoa repens* (W. Bartram) Small, Saw palmetto,  
MH, SB, SB/MH; C; **50, 324, 465**

**ASPARAGACEAE**

\**Asparagus oethiopicus* L., Sprenger's asparagus-  
fern, DA; o; [CAT i]; **19**

**ASTERACEAE**

*Ageratina jucunda* (Greene) Clewell & Wooten,  
Hammock snakeroot, MH; i; **504**

*Ambrosia artemisiifolia* L., Common ragweed, DA;  
C; **290**

*Baccharis angustifolia* Michx., Saltwater  
falsewillow, SB; i; **657**

*Baccharis halimifolia* L., Groundsel tree, DA, MH, SB;  
o; **494, 682**

*Bidens alba* (L.) DC. var. *radiata* (Sch. Bip.) R. E.  
Ballard ex Melchert, Beggarticks, DA; o; **133**

*Borrchia frutescens* (L.) DC., Bushy seaside oxeye,  
FD, SB, SM/BF; o; **54, 407, 626**

\**Calypotropis vialis* Less., Straggler daisy, DA; r;  
**509**

*Cirsium horridulum* Michx., Purple thistle, DA, SB;  
o; **500, 623**

*Conyza canadensis* (L.) Cronquist var. *canadensis*,  
Canadian horseweed, DA, HB; o; **251, 490, 535**

*Erechtites hieracifolius* (L.) Raf. ex DC., American  
burnweed, DA; o; **25, 446**

*Erigeron quercifolius* Poir., Oakleaf fleabane, DA, HB;  
o; **611**

*Eupatorium capillifolium* (Lam.) Small ex Porter  
& Britton, Dogfennel, SM/BF; r; **538**

*Gaillardia pulchella* Foug., Firewheel, FD, HB; C; **80,**  
**102, 454**

*Gamochaeta antillana* (Urban) A. Anderberg,  
Narrowleaf purple everlasting, DA; o; **608, 651**  
[*Gamochaeta falcata* (Lam.) Cabrera, misap-  
plied (R. Wunderlin, pers. comm.), as in  
Wunderlin & Hansen (2003): The correct  
name for the species in the southeastern  
United States is clarified by Nesom (2004).]

*Helianthus debilis* Nutt. subsp. *debilis*, East coast  
dune sunflower, FD, HB; C; **79, 103**

*Heterotheca subaxillaris* (Lam.) Britton & Rusby,  
Camphorweed, DA, FD, HB; C; **389, 497, 503**

*Iva frutescens* L., Bigleaf sumpweed, SB, SB/MH; C;  
**267**

*Iva imbricata* Walter, Seacoast marshelder, FD, HB;  
o; **246, 398**

*Krigia virginica* (L.) Willd., Virginia dwarf dandelion,  
HB; r; **652**

*Lactuca graminifolia* Michx., Grassleaf lettuce, DA;  
r; **634**

*Mikania cordifolia* (L. f.) Willd., Florida Keys  
hemipine, SB; o; **470**

*Pluchea odorata* (L.) Cass., Sweet scent, SM/BF; i;  
**397**

*Solidago odora* Aiton var. *chapmanii* (A. Gray)  
Cronquist, Chapman's goldenrod, DA; r; **502**

*Solidago stricta* Aiton, Wand goldenrod, DA, SM/  
BF; i; **530, 560**

\**Sonchus asper* (L.) Hill, Spiny sowthistle, DA; i; **510,**  
**607**

\**Sonchus oleraceus* L., Common sowthistle, DA; i;  
**635**

\**Taraxacum officinale* Weber ex F. H. Wigg., Com-  
mon dandelion, DA; r; **663, 672**

\**Youngia japonica* (L.) DC., Oriental false  
hawksbeard, DA; i; **644**

**BATACEAE**

*Batis maritima* L., Saltwort, SM; C; **20, 248, 479**

**BORAGINACEAE**

*Heliotropium curassavicum* L., Seaside heliotrope,  
FD; r; **245**

**BRASSICACEAE**

*Cakile edulenta* (Bigelow) Hook. subsp. *harperi*  
(Small) Rodman, American searocket, FD, HB,  
SM/BF; C; **73, 114, 618, 627, 661**

*Cakile lanceolata* (Willd.) O. E. Schultz, Coastal  
searocket, FD; i; **98**

\**Coronopus didymus* (L.) Sm., Lesser swinecress, DA; r; 604

*Descurainia pinnata* (Walter) Britton, Western tansymustard, DA; r; 606

*Lepidium virginicum* L., Virginia pepperweed, DA, HB, SM/BF; i; **24, 35, 548, 620**

## BROMELIACEAE

\**Neoregelia spectabilis* (Moore) L.B. Sm., Painted fingernail, CULT; 523

*Tillandsia recurvata* (L.) L., Ballmoss, MH; o; 522

*Tillandsia usneoides* (L.) L., Spanish moss, MH; C; 309

## CACTACEAE

*Opuntia pusilla* (Haw.) Haw., Cockspur pricklypear, DA, FD, SM/BF; C; **48, 266, 492**

*Opuntia stricta* (Haw.) Haw., Erect pricklypear, DA, HB, SB, SM/BF; C; **71, 75, 116, 438**

## CAMPANULACEAE

*Triodanis perfoliata* (L.) Nieuwl., Claspng Venus' lookingglass, DA; r; 605

## CANNABACEAE

*Celtis laevigata* Willd., Sugarberry, MH; C; **660**

## CARYOPHYLLACEAE

*Paronychia baldwinii* (Torr. & A. Gray) Fenzl ex Walp., Baldwin's nailwort, SM/BF; r; **537**

*Paronychia herniarioides* (Michx.) Nutt., Coastalplain nailwort, SM/BF; i; **259**

\**Stellaria media* (L.) Vill., Common chickweed, DA; o; **637, 643, 665**

## COMMELINACEAE

\**Commelina diffusa* Burm. f. var. *diffusa*, Common dayflower, DA; r; 673

*Commelina erecta* L., Whitemouth dayflower, DA, HB; i; **61, 96, 243**

*Tradescantia ohiensis* Raf., Bluejacket, DA; o; i; 458

## CONVOLVULACEAE

*Dichondra carolinensis* Michx., Carolina ponysoot, HB; i; **654, 671**

\**Ipomoea batatas* (L.) Lam., Sweetpotato, DA; r; **460**

*Ipomoea cordatotriloba* Dennst., Tievine, DA; i; 505

*Ipomoea imperati* (Vahl) Griseb., Beach morning-glory, FD, OB; C; 95

*Ipomoea pandurata* (L.) G. Mey., Man-of-the-earth, DA; r; 459

*Ipomoea pes-caprae* (L.) R. Br., Railroad vine, FD, OB; C; 97

\**Merremia dissecta* (Jacq.) Hallier f., Noyau vine, DA; r; 101, 289

## CYPERACEAE

\**Cyperus esculentus* L., Yellow nutgrass, SM/BF; o; **29, 69**

*Cyperus polystachyos* Rottb., Manyspike flatsedge, DA, SM/BF; o; **28, 419, 455**

*Cyperus retrorsus* Chapm., Pinebarren flatsedge, HB, SM/BF; o; **36, 37, 38, 260, 261, 557**

*Cyperus tetragonus* Elliott, Fourangle flatsedge, DA; i; 310, 521

*Fimbristylis spadiacea* (L.) Vahl, Marsh fimbry, DA, SM/BF; o; **31, 264, 424, 540**

*Scleria triglomerata* Michx., Tall nutgrass, DA, SM/BF; r; **263, 312**

## EBENACEAE

*Diospyros virginiana* L., Common persimmon, MH; r; 501

## ERICACEAE

\**Rhododendron simsii* Planch., Indian azalea, CULT, 642

## EUPHORBIACEAE

*Acalypha gracilens* A. Gray, Slender threeseed mercury, DA; i; 526

*Chamaesyce bombensis* (Jacq.) Dugand, Dixie sandmat, DA, OB, FD; C; **62, 422, 463**

*Chamaesyce hirta* (L.) Millsp., Pillpod sandmat, DA; i; 301

*Chamaesyce hyssopifolia* (L.) Small, Hyssopleaf sandmat, DA, HB; o; 491, 508

*Chamaesyce maculata* (L.) Small, Spotted sandmat, HB; C; **39a**

*Cnidoscolus stimulosus* (Michx.) Engelm. & A. Gray, Tread softly, DA, FD; C; **76, 106**

*Croton glandulosus* L. var. *glandulosus*, Vente conmigo, DA, HB; o; 302, **399, 428, 482, 527**

*Croton punctatus* Jacq., Gulf croton, FD; C; **45, 112, 441**

*Poinsettia cyathophora* (Murray) Bartl., Paintedleaf, DA, HB; i; 17, 94, 135, **406, 447, 493**

## FABACEAE

*Centrosema virginianum* (L.) Benth., Spurred butterfly pea, DA, HB; o; 291, **405**

*Chamaecrista fasciculata* (Michx.) Greene, Partridge pea, FD, HB; C; **65, 105, 258**

\**Desmodium tortuosum* (Sw.) DC., Dixie ticktrefoil, DA; r; 478



*Erythrina herbacea* L., Coralbean, DA, HB; r; 430, 616, 628

*Galactia volubilis* (L.) Britton, Downy milkpea, DA; o; 81, 288, 396

\**Indigofera hirsuta* L., Hairy indigo, DA; r; 481

\**Indigofera spicata* Forssk., Trailing indigo, DA; i; 303, 425

\**Medicago lupulina* L., Black medick, DA; o; 601, 631

\**Medicago polymorpha* L., Burdock, DA; o; 630, 667

\**Melilotus albus* Medik., White sweetclover, DA; o; 82, 617, 629

\**Melilotus indicus* (L.) All., Indian sweetclover, DA; i; 614, 633

\**Senna obtusifolia* (L.) H.S. Irwin & Barneby, Coffeeweed, HB, r; 597

*Strophostyles helvola* (L.) Elliott, Trailing fuzzybean, DA, FD, HB, SM/BF; c; 32, 86, 119, 390, 437, 471, 487

*Vigna luteola* (Jacq.) Benth., Hairypod cowpea, DA; o; 388, 483

## FAGACEAE

*Quercus chapmanii* Sarg., Chapman's oak, MH; i; 669

*Quercus geminata* Small, Sand live oak, MH, SB/MH; c; 318, 644

*Quercus myrtifolia* Willd., Myrtle oak, MH, SB/MH; o; 275, 316

*Quercus virginiana* Mill., Live oak, MH, SB/MH; c; 317

## GERANIACEAE

*Geranium carolinianum* L., Carolina cranesbill, DA; i; 619

## HYPERICACEAE

*Hypericum gentianoides* (L.) Britton et al., Pineweed, SM/BF; r; 534

*Hypericum hypericoides* (L.) Crantz, St. Andrew's-cross, SB, MH, SM/BF; i; 277, 436, 536

## JUGLANDACEAE

\**Carya illinoensis* (Wangenh.) K. Koch, Pecan, CULT; 2

## JUNCACEAE

*Juncus dichotomus* Elliott, Forked rush, SM/BF; o; 272

*Juncus roemerianus* Scheele, Black rush, SM, SM/BF; o; 27, 394

## LAMIACEAE

*Callicarpa americana* L., American beautyberry, MH; o; 6

\**Hyptis mutabilis* (Rich.) Briq., Tropical bushmint, DA; i; 296

*Monarda punctata* L., Spotted beebalm, DA, HB; o; 283, 297, 472, 484

*Salvia lyrata* L., Lyreleaf sage, DA; o; 5, 495, 594

*Stachys floridana* Shuttlew. ex Benth., Florida hedge-nettle, DA; i; 598

*Teucrium canadense* L., Wood sage, SB, MH; o; 311, 423

*Trichostema dichotomum* L., Forked bluecurls, HB, SM/BF; i; 249, 421, 485

## LAURACEAE

\**Cinnamomum camphora* (L.) J. Presl, Camphortree, [CAT I], CULT; 638

*Persea barbonia* (L.) Spreng., Red bay, MH, SB/MH; c; 7, 89, 107, 255, 322, 467, 486

## MAGNOLIACEAE

*Magnolia grandiflora* L., Southern magnolia, MH; r; 677

## MALVACEAE

*Malvastrum coccineum* (Desr.) Britton ex Small, False mallow, DA; i; 131

\**Malvastrum coromandelianum* (L.) Garcke, Threelobe false mallow, DA; i; 294, 512

\**Malvastrum penduliflorum* DC., Turkscap mallow, CULT; 517 (Persisting after cultivation near maintenance road entrance.)

*Sida rhombifolia* L., Cuban jute, DA; o; 295, 511

## MORACEAE

*Morus rubra* L., Red mulberry, MH; r; 552

## MYRICACEAE

*Myrica cerifera* L., Southern bayberry, MH, SB, SB/MH; c; 279, 448, 514, 656

## NYCTAGINACEAE

*Boerhavia diffusa* L., Red spiderling, DA; o; 304

## OLEACEAE

*Forestiera segregata* (Jacq.) Krug & Urb., Florida swampprivet, SB; i; 416

\**Jasminum mesnyi* Hance, Japanese jasmine, CULT; 675

## ONAGRACEAE

*Gaura angustifolia* Michx., Southern beeblossom, DA, FD; c; 313, 395

*Oenothera humifusa* Nutt., Seabeach evening-primrose, DA, FD; C; 18, **87**, 124

*Oenothera laciniata* Hill, Cutleaf eveningprimrose, DA; I; 609

\**Oenothera speciosa* Nutt., Pinkladies, DA; I; 595

## OXALIDACEAE

*Oxalis corniculata* L. (incl. *O. stricta* L.), Common yellow woodsorrel, DA, HB; C; **56**, 461

\**Oxalis rubra* A. St.-Hil., Windowbox woodsorrel, DA; I; 596, 674

## PHYLLANTHACEAE

*Phyllanthus abnormis* Baill., Drummond's leafflower, DA, FD, HB; C; **39b**, **88**, 104, **253**, 293, 434

\**Phyllanthus tenellus* Roxb., Mascarene Island leafflower, DA, HB; I; 91, 462

## PHYTOLACCACEAE

*Phytolacca americana* L. var. *rigida* (Small) Caulkins & Wyatt, American pokeweed, DA, HB; I; 15, 429 [This distinct geographical race, previously included in the flora by Wunderlin (1998) but not in the recent edition (Wunderlin & Hansen 2003), merits recognition (see Caulkins & Wyatt 1990).]

*Rivina humilis* L., Rougeplant, MH; I; 282

## PLANTAGINACEAE

*Bacopa monnieri* (L.) Pennell, Herb-of-grace, SM/BF; O; **400**, **546**

*Lunaria canadensis* (L.) Chaz., Canada toadflax, HB; I; **74**, **662**

*Plantago virginica* L., Virginia plantain, DA; I; 615, **649**

*Scoparia dulcis* L., Sweetbroom, HB, SM/BF; I; **408**, 498

## PLUMBAGINACEAE

*Limonium carolinianum* (Walter) Britton, Carolina sealavender, SM, SM/BF; O; **252**, **539**

## POACEAE

*Andropogon glomeratus* (Walter) Britton et al. var. *hirsutior* (Hack.) C. Mohr, Bushy bluestem, DA; C; 457

*Andropogon glomeratus* var. *pumilus* (Vasey) Vasey ex L. H. Dewey, Bushy bluestem, DA, HB; C; 506, **658**

*Andropogon virginicus* L. var. *virginicus*, Broomsedge bluestem, DA; I; 507

*Cenchrus echinatus* L., Southern sandbur, DA, FD; I; **66**, **411**, 451

*Cenchrus gracillimus* Nash, Slender sandbur, DA; O; **53**, **84**, 117

*Cenchrus spinifex* Cav., Coastal sandbur, DA; O; 305

*Cenchrus tribuloides* L., Sanddune sandbur, FD; I; 123, 450

\**Cynodon dactylon* (L.) Pers., Bermudagrass, DA; C; 307

\**Doctyloctenium aegyptium* (L.) Willd. ex Asch. & Schweinf., Durban crowfootgrass, DA; O; **420**, 466

*Dicanthelium scabriusculum* (Elliott) Gould & C. A. Clark, Woolly witchgrass, DA; O; 520, 646

\**Digitaria bicornis* (Lam.) Roem. & Schult., Asia crabgrass, DA; I; 126

*Digitaria filiformis* (L.) Koeler var. *filiformis*, Slender crabgrass, DA; O; **417**

*Distichlis spicata* (L.) Greene, Saltgrass, HB; O; **556**

\**Fleusine indica* (L.) Gaertn., Indian goosegrass, DA; O; 286

*Eragrostis elliottii* S. Watson, Elliott's lovegrass, SM/BF; O; **562**

*Eragrostis secundiflora* J. Presl subsp. *oxylepis* (Torr.) S. D. Koch, Red lovegrass, DA, HB; O; **77**, 121

*Eustachys petraea* (Sw.) Desv., Pinewoods fingergrass, DA, HB; O; **41**, **83**, 499

\**Lolium perenne* L., Italian ryegrass, DA; I; 613

*Muhlenbergia capillaris* (Lam.) Trin. var. *filipes* (M. A. Curtis) Chapm. ex Beal, Gulf hairawn muhly, HB; C; 488, 489, **549**

*Muhlenbergia capillaris* var. *trichopodes* (Elliott) Vasey, Cutover muhly, SM/BF; O; **561**

*Oplismenus hirtellus* (L.) P. Beauv., Woodsgrass, MH; O; 525

*Panicum amarum* Elliott, Bitter panicgrass, FD, HB; C; 464, 515, **551**

\**Paspalum notatum* Flügge var. *saurae* Parodi, Bahiagrass, DA; O; 265

*Paspalum setaceum* Michx., Thin paspalum, DA; O; 287, 308, 528

\**Poa annua* L., Annual bluegrass, DA; O; **650**, 668

*Setaria parviflora* (Poir.) Kerguelen, Yellow bristlegrass, SM/BF; O; **22**, **63**

*Spartina alterniflora* Loisel., Saltmarsh cordgrass, SM; C; 474, **542**, **554**

*Spartina patens* (Aiton) Muhl., Marshhay cordgrass, FD; O; **23**, **393**, **550**, **555**

*Sphenopholis obtusata* (Michx.) Scribn., Prairie wedgescale, DA; O; 622, **636**

\**Sporobolus indicus* (L.) R. Br. var. *pyramidalis* (P. Beauv.) Veldkamp, West Indian dropseed, DA; i; 456

*Sporobolus virginicus* (L.) Kunth, Seashore dropseed, FD, SM/BF; C; **256, 271, 412, 443, 558**  
*Stenotaphrum secundatum* (Walter) Kuntze, St. Augustinegrass, SB; r; **30** [This common lawn grass is listed in Wunderlin & Hansen (2003) as native, and our collections in remote areas are likely not escapes from cultivation.]

*Triplaris purpurea* (Walter) Chapm., Purple sandgrass, DA, SM/BF; i; **532, 559**

*Uniola paniculata* L., Seaoats, FD, HB; C; **67, 68, 125, 262**

### POLEMONIACEAE

*Ipomopsis rubra* (L.) Wherry, Standingcypress, HB; r; 432

### POLYGALACEAE

*Polygala incarnata* L., Procession flower, SM/BF; i; **533**

### POLYGONACEAE

*Rumex hastatus* Baldwin, Heartwing dock, DA, HB; i; 610

### PORTULACACEAE

*Portulaca oleracea* L., Little hogweed, DA, r; 298

*Portulaca pilosa* L., Pink purslane, DA, SM/BF; i; **273, 299, 415, 444**

### ROSACEAE

\**Eriobotrya japonica* (Thunb.) Lindl., Loquat, MH; r; 274 (A colony of several saplings naturalized in the hammock.)

*Prunus caroliniana* (Mill.) Aiton, Carolina laurelcherry, DA; i; 640

*Prunus serotina* Ehrh. var. *serotina*, Black cherry, MH, SB/MH; O; **44, 541, 641, 655**

\**Rhaphiolepis indica* (L.) Lindl., Indian hawthorn, CULT; 676

*Rubus trivialis* Michx., Southern dewberry, DA, HB, SB/MH; i; 612, **680**

### RUBIACEAE

*Chiococca alba* (L.) Hitchc., Snowberry, HB; r; **401, 531**

*Diodia teres* Walter, Poor joe, DA; r; 666

*Galium hispidulum* Michx., Coastal bedstraw, DA, HB, MH; O; **58, 414, 433, 524**

*Houstonia procumbens* (J.F. Gmel.) Standl., Innocence, HB; i; 442, 473, **653, 679**

\**Oldenlandia corymbosa* L., Flattop mille grains, DA; i; 300

\**Richardia brasiliensis* Gomes, Tropical Mexican clover, DA; i; 306

*Spermacoce assurgens* Ruiz & Pav., Woodland false buttonweed, DA; r; 292, 513

*Stenaria nigricans* (Lam.) Terrell var. *nigricans*, Diamondflowers, DA; o; **57**

### RUTACEAE

\**Severinia buxifolia* (Poir.) Ten., Chinese boxorange, MH; 278, 678 [CULT] (Cultivated near park maintenance buildings and also escaped and apparently established in the nearby hammock.)

*Zanthoxylum clava-herculis* L., Hercules-club, MH, SB/MH; C; **47, 257, 403, 453, 632**

### SANTALACEAE

*Phoradendron leucarpum* (Raf.) Reveal & M.C. Johnston, Oak mistletoe, MH; i; **418**

### SAPOTACEAE

*Sideroxylon tenax* L., Tough bully, MH, SB/MH; C; 9, **42, 108, 270, 435, 469**

### SMILACACEAE

*Smilax auriculata* Walter, Earleaf greenbrier, MH, SB, SB/MH; C; **4, 43, 109, 426, 496**

*Smilax bona-nox* L., Saw greenbrier, O; MH, SB/MH; 8

### SOLANACEAE

*Lycium carolinianum* Walter, Christmasberry, SM/BF; r; **553, 625**

*Physalis walteri* Nutt., Walter's groundcherry, FD, HB; C; **33, 60, 111**

*Solanum chenopodioides* Lam., Black nightshade, HB; i; 445

### TETRACHONDRAEAE

*Polypremum procumbens* L., Rustweed, DA, HB; O; 118, 134, **254**

### URTICACEAE

*Parietaria praetermissa* Hinton, Clustered pellitory, DA; r; 93

*Pilea microphylla* (L.) Liebm., Artillery plant, MH; i; **681**

### VERBENACEAE

\**Lantana camara* L., Lantana, [CAT I], DA, HB; O; **85, 100, 599**

*Phyla nodiflora* (L.) Greene, Turkey tangle fogfruit, DA, HB; O; 120, 136, 285

\**Verbena bonariensis* L., Purpletop vervain, DA; i; 132

*Verbena officinalis* L. subsp. *halei* (Small) S. C. Barber, Texas vervain, DA; o; 99, 129

#### VITACEAE

*Ampelopsis arborea* (L.) Koehne, Peppervine, DA, MH, SB; o; 14, **34, 250**

*Cissus trifoliata* (L.) L., Sorrelvine, SB; i; 314

*Parthenocissus quinquefolia* (L.) Planch., Virginia creeper, DA, SB, MH; o; 12, **78, 449**

*Vitis aestivalis* Michx., Summer grape, MH, SB; C; **40, 315**

*Vitis rotundifolia* Michx., Muscadine, MH, SB; o; 10, 320

#### ZINGIBERACEAE

\**Alpinia zerumbet* (Pers.) B.L. Burtt & R.M. Sm., Shellflower, CULT; 639

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